

CLAIMS

1. A method of analysis of a printed circuit board comprising:
generating an image of the printed circuit board; and
5 determining the presence of an oxide from an analysis of the image.
2. A method according to claim 1 wherein determination of the presence of an oxide at a particular pixel of the image is made without determining whether the pixel is a laminate pixel.
- 10 3. A method according to claim 1 ~~or claim 2~~ wherein generating an image comprises generating a pixelated image having brightness values for each pixel and wherein determining the presence of the of an oxide comprises determining the presence of the oxide responsive to the brightness values.
- 15 4. A method according to claim 1 ~~or claim 2~~ wherein generating an image comprises generating a plurality of images each at a different color and having brightness values for each pixel in each image and wherein determining the presence of an oxide includes making the determination based on an analysis of the pixel values in at least two of the images.
- 20 5. A method according to claim 4 wherein the plurality of images comprises a red, a green and a blue image.
- 25 6. A method according to claim 4 ~~or claim 5~~ wherein determination of the presence of an oxide includes eliminating pixels from consideration based on a brightness value for a single color.
7. A method according to claim 6 wherein the color is red and wherein pixels having a red brightness level below a lower given value are eliminated from consideration as being an oxide.
- 30 8. A method according to claim 6 ~~or claim 7~~ wherein the color is red and wherein pixels having a red value above an upper given value are eliminated from consideration as being an oxide.

a 9. A method according to ~~any of claims 6-8~~ wherein determination of the presence of an oxide includes eliminating pixels from consideration based on a comparison between the brightness level of two colors.

5

10. A method according to claim 9 wherein the two colors are red and green and wherein the pixel is eliminated if its red brightness value compared to that of copper is less than its green brightness value compared to copper.

a 10 11. A method according to claim 9 ~~or claim 10~~ wherein the two colors are red and blue and wherein the pixel is eliminated if its red brightness value compared to that of copper is less than its blue brightness value compared to copper.

a 12. A method according to ~~any of claims 6-11~~ wherein determination of the presence of an oxide includes eliminating pixels from consideration based on an analysis of the brightness levels of three colors.

a 13. A method according to ~~any of claims 6-12~~ wherein determination of the presence of an oxide includes eliminating pixels from consideration based on a comparison between the brightness level of three colors with brightness levels for copper.

14. A method according to claim 13 wherein a pixel is eliminated from consideration as an oxide when its color brightness values have a Mahalanobis distance greater than a given value from the mean values of the brightness values for copper.

25

15. A method according to claim 14 wherein the given value for the Mahalanobis distance is between 4 and 8.

16. A method according to claim 14 wherein the given value for the Mahalanobis distance is about 6.

30

a 17. A method according to ~~any of claims 2-16~~ wherein the determination of the presence of an oxide is made based on a relationship between the brightness values of the image and brightness values characteristic of copper.

a 5 18. A method according to ~~any of claim 4, 5 or 12~~ and comprising:
determining a color gamut characteristic of the oxide; and
comparing the color values of a pixel to the determined gamut of values to determine if the pixel is an oxide.

10 19. A method of multi-color image processing, comprising:
generating a plurality of images of an object, said images being acquired at different wavelength ranges;
determining gradient values of the intensity in an image; and
analyzing the multi-color images to determine characteristics of the object,
15 wherein regions of the image at or near high gradients are analyzed differently from other regions of the image.

20 20. A method according to claim 19 wherein the regions at high gradients are excluded from analysis.

a 21. A method according to claim 19 ~~or claim 20~~ wherein regions of relatively lower gradients are analyzed to determine characteristics of the object.

a 22. A method according to ~~any of claims 19-21~~ wherein the object is a printed circuit
25 board.

add
on